

## I/WE CLAIM:

- 1 A system for extending the transmission path across a range of frequencies, the system comprising:
- a compensation unit for dividing and amplifying a signal;
- 5 a home outlet splitter unit for splitting and amplifying a signal; and
- a home outlet unit for expanding bandwidth and filtering frequencies; and
- an extension unit to a set-top box; and
- an enhanced cable connector assembly for transmitting a signal;
- whereby enabling transmission of data at substantially higher data rates. The system of
- 10 claim 1 further comprising a data communication unit for communicating data.
2. The system of claim 1 further comprising a hub-station unit for adding gain and slope to losses of a signal transmitted and combining the signal transmitted by a transmission center with a signal transmitted by a data communication unit.
- 15 3. The system of claim 1 wherein the communication network is a CATV (Cable Television) system utilizing a plurality of transmission channels.
4. The system of claim 1 wherein the compensation unit comprises,
- 20 frequency band divider means to separate at least two signal streams for selective processing;
- downstream signal amplifying means for amplifying a signal representative of information units transmitted by a transmission center to users; and
- upstream signal amplifying means for amplifying a signal representative of
- 25 information sent by users to a transmission center.
5. The system of claim 1 wherein the compensation unit further comprises;
- an input for receiving a downstream signal and for transmitting an upstream signal;
- at least one frequency selective circuit coupled to the input for separating at least
- 30 two different bands of frequencies of the downstream signal and the upstream signal;

an equalizer circuit coupled to the output of the frequency selective circuit for attenuating lower frequencies of the downstream signal and the upstream signal modulated across at least one band of frequencies; and  
at least one output providing the downstream signal after being processed by the  
5 frequency selective circuit, the equalizer circuit, and the amplifier circuit and for receiving the upstream signal from the equipment the compensation unit is coupled to.

6. The system of claim 1 wherein the compensation unit further comprising,  
10 an amplifier circuit coupled to the output of the equalizer circuit for the amplification of the downstream signal and the upstream signal modulated across at least one band of frequencies.

7. The system of claim 1 wherein the compensation unit further comprising:  
15 a communication network line distribution unit coupled to the output of the compensation unit for receiving at least one downstream signal, the line distribution unit having an output for providing the downstream signal and a upstream signal for processing by other network equipment.

20 8. The system of claim 5 wherein the frequency selective circuit comprising:  
a low pass filter having an output coupled to the cable television network line distribution unit to selectively process a selected band of frequencies of the downstream signal and the a selected band of frequencies of the upstream signal; and  
a high pass filter having an output coupled to the equalizer and amplifier circuits to  
25 selectively process a selected band of frequencies of the downstream signal and a selected same band of frequencies of the upstream signal.

9. The system of claim 6 wherein the equalizer circuit comprises a high pass filter.

30 10. The system of claim 3 wherein the hub station unit comprises:  
means for adding gain and slope to losses of the signal transmitted in the downstream direction from a transmission center to the users;

means for adding gain and slope to losses of the signal transmitted in the upstream direction from the users to a transmission center; and

multiplexer means to combine the signal transmitted by a transmission center with the signal transmitted by a data communication unit.

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11. The system of claim 2 wherein the data communication unit comprises:

receiver-transmitter means to receive data from a data communication network and to transmit data to the data communication network;

demodulator-modulator means to encode data to a data communication network; and

- 10 data router means to direct data to a data communication network and to direct the data to a central processing unit for processing; and

processing means to compute the location and spectral density of users.

12. The system of claim 1 wherein the home splitter unit comprises:

- 15 divider means to split the signal modulated across the extended range of frequencies to a varied number of users; and

amplifier means to compensate for the losses in the signal due to line characteristics.

13. The system of claim 1 wherein the home outlet unit comprises:

- 20 bandwidth expanding means to add to the standard usable bandwidth a extended range of frequencies; and

filtering means to separate the appended extended range of frequencies to downstream and upstream pass regions.

- 25 14. The system of claim 1 wherein the information unit encoded into electronic signals carry video, sound, and data content received from external information sources.

- 15 The system of claim 5 wherein the compensation unit is connected to the communication network to refresh the transmitted signal and to overcome line drop

- 30 losses due to network infrastructure topography.

16. The system of claim 5 wherein the compensation unit is connected as an enhancement unit to the existing components of the communication network.
17. The system of claim 5 wherein the compensation unit is connected to the  
5 communication network as a standalone unit.
18. The system of claim 5 wherein the compensation unit connected to the communication network as a symmetrical unit to support two-way symmetrical transmission of signals.
- 10 19. The system of claim 5 wherein the compensation unit is connected to the communication network as an asymmetrical unit to support two-way asymmetrical transmission of signals.
20. The system of claim 11 wherein the hub station unit is connected as an enhancement  
15 unit to the existing local hub of the communication network.
21. The system of claim 11 wherein the hub station unit connected to the communication network as a symmetrical device to support two-way symmetrical transmission of the signals.
- 20 22. The system of claim 11 wherein the hub station unit is connected to the communication network as an asymmetrical device to support two-way asymmetrical transmission of the signals.
- 25 23. The system of claim 12 wherein the data communication unit is operative in connecting the hub station unit with the external data communication network providing information content.
24. The system of claim 13 wherein the home splitter unit connected to the communication  
30 network as a symmetrical device to support two-way symmetrical transmission of the signal.

25. The system of claim 13 wherein the home splitter unit is connected to the communication network as an asymmetrical device to support two-way asymmetrical transmission of the signals.

5 26. The system of claim 1 wherein the enhanced cable connector assembly comprises;  
a coaxial cable connector for transmitting the downstream signal and the upstream signal between the components of a cable television system, and  
a coaxial adapter physically attached to the standard coaxial connector, operative in transmitting frequencies up to 10GHz.

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27. An extension unit to a set-top box comprising the elements of:  
tuner means for controlling the additional channels within the extended range of frequencies,  
switching means to enable selection of mode of operation; and  
15 filtering means to separate the appended extended range of frequencies to downstream and upstream pass regions; and  
modem means to encode the information and transmit the data to the user; and  
modem means to decode the information received from the user and transmit the information upstream to the transmission center.

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28. The extension unit to the set-box according to claim 28 wherein the extension unit to the set-top box is connected to the communication network as a symmetrical device to support two-way symmetrical transmission of the signals.

25 29. The extension unit to the set-top box according to claim 28 wherein the extension unit to the set-top box is connected to the communication network as an asymmetrical unit to support two-way asymmetrical transmission of the signals

30. The extension unit to the set-top box according to claim 28 wherein the extension unit to the set-top box transmits practically the entire frequency range of existing CATV signals practically unmodified at practically the standard power levels.

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31. A compensation unit dividing and amplifying a signal comprises;

frequency band divider means to separate at least two signal streams for selective processing;

- 5 downstream signal amplifying means for amplifying a signal representative of information units transmitted by a transmission center to users, and upstream signal amplifying means for amplifying a signal representative of information sent by users to an transmission center.

32. The compensation unit of claim 32 further comprises;

- 10 an input for receiving a downstream signal and for transmitting an upstream signal, at least one frequency selective circuit coupled to the input for separating at least two different bands of frequencies of the downstream signal and the upstream signal;

- 15 an equalizer circuit coupled to the output of the frequency selective circuit for attenuating lower frequencies of the downstream signal and the upstream signal modulated across at least one band of frequencies; and

- at least one output providing the downstream signal after being processed by the frequency selective circuit, the equalizer circuit, and the amplifier circuit and for receiving the upstream signal from the equipment the compensation unit is coupled to.

33. The the compensation unit of claim 32 further comprising;

- 25 an amplifier circuit coupled to the output of the equalizer circuit for the amplification of the downstream signal and the upstream signal modulated across at least one band of frequencies.

34. The compensation unit of claim 32 further comprising:

- 30 a communication network line distribution unit coupled to the output of the compensation unit for receiving at least one downstream signal, the line distribution unit having an output for providing the downstream signal and a upstream signal for processing by other network equipment.

35. A hub station unit for adding gain and slope to losses of the signal transmitted and for combining the signal transmitted by an transmission center with a signal transmitted by a data communication unit the hub station comprises:

means for adding gain and slope to losses of the signal transmitted in the downstream

- 5 direction from a transmission center to the users;

means for adding gain and slope to losses of the signal transmitted in the upstream direction from the users to a transmission center; and

multiplexer means to combine the signal transmitted by a transmission center with the signal transmitted by a data communication unit.

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36. A home splitter unit for splitting and amplifying a signal comprises:

divider means to split the signal modulated across the extended range of frequencies to a varied number of users; and

amplifier means to compensate for the losses in the signal due to line characteristics.

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37. A home outlet unit for expanding bandwidth and filtering frequencies comprises:

bandwidth expanding means to add to the standard usable bandwidth a extended range of frequencies; and

filtering means to separate the appended extended range of frequencies to

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downstream and upstream pass regions.

38. In a communication network utilizing a communication media infrastructure for the transmission of a broadband signal representative of information units received from and sent to external information sources the information units encoded into modulated
- 25 electronic signals the signals multiplexed into the broadband electronic signal, from a transmission center via diverse electronic components operative in the preservation of the transmitted signal vital characteristics to a plurality of users and from the plurality of users via the transmission media via the diverse electronic components operative in maintaining the functional characteristics of the transmitted broadband signal to the
- 30 transmission center, a method for utilizing an expanded transmission path operative across a substantially increased range of frequencies, the method comprising:

combining the signals representative of the information received from information sources/users into a combined broadband signal modulated across a substantially expanded bandwidth;

superimposing signals representative of information units received from additional information sources connected at various locations to the transmission path onto the broadband signal modulated across the substantially expanded bandwidth; and

transmitting the combined broadband signal modulated across a substantially expanded bandwidth to a plurality of users/transmission center; and

maintaining the functional characteristics of the broadband signal modulated across a substantially expanded bandwidth during a series of processing activities performed by a set of components operatively participating in the expanded bandwidth transmission process whereby utilizing the standard transmission medium previously operating in a significantly narrower bandwidth for transmission in a substantially expanded bandwidth.

39. The method of claim 39 further comprising the step of:

dividing the broadband signal modulated across a substantially expanded bandwidth into the constituent signals representative of the information received from the information sources/users.

40. The method of claim 39 further comprising the step of:

reproducing the signals representative of the information sources for interaction with a plurality of users/external information sources.

41. The method of claim 39 wherein the step of maintaining comprises the sub steps of:

amplifying the broadband signal for overcoming line drop losses due to the network infrastructure topography;

adding gain and slope to the broadband signal in order to compensate for the losses suffered as a result of the transmission infrastructure characteristics; and



frequency-relatedly filtering the broadband signal to separate the signal according to predefined transmission regions and by predefined parameters relating to the content type and the direction of the broadband signal; and  
frequency-relatedly tuning the broadband signal to control the division of the  
5 signal into predefined frequency regions within the substantially expanded bandwidth.

42. The method of claim 39 wherein the step of superimposing comprises the sub-steps of:  
receiving/transmitting the signals representative of the information units from/ to  
10 additional information sources/users;  
processing the signals representative of the information units received/transmitted from/to additional information sources/users to determine the location of the signals in regard to a predefined frequency band with the substantially expanded transmission bandwidth; and  
15 modulating/demodulating the signals received/transmitted from/to the additional information sources/users; and  
routing the signals representative of the information units received/transmitted from/to the additional information sources/users to the suitable processing unit and to the suitably oriented network components.

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43 The method of claim 40 wherein the step of dividing comprises the step of  
splitting the broadband signal modulated across the substantially expanded bandwidth in order to distribute the separated signal elements to a predefined group of users.

25 44. The method of claim 41 wherein the step of reproducing comprises the step of:  
filtering the broadband signal to separate the extended range of frequencies from the standard range of frequencies; and  
separating the broadband signal to isolate the extended range of frequencies into a downstream and upstream region; and  
30 modulating/demodulating the signal to decode/encode the information carried by the signal in order to reproduce the signal for interaction with the information sources/users.

45. The method of claim 39 wherein the communication network is a cable television system carrying video, audio and data information units and any combination thereof to a plurality of users utilizing a plurality of transmission channels.

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46. A two-way multi-user transmission and communication system having the capability of utilizing a substantially expanded range of frequencies in order to transmit a significantly increased quantity of information units encoded into electronic signals and inserted into a transmittable broadband signal at frequency-related locations the broadband signal  
10 having prior transmittable information multiplexed therein without affecting the simultaneous transmission of the existing transmittable information to a plurality of users in response to the users' corresponding demands, the system comprising:
- a compensation unit including downstream and upstream amplifying units in order to amplify the broadband signal;
  - 15 a home outlet splitter unit including a signal divider to distribute the split broadband signal modulated across a substantially expanded range of frequencies among a predefined group of users;
  - a home outlet unit including filtering components having the capability of handling an expanded range of frequencies in order to separate the broadband signal into  
20 predefined range of and to suitable manipulate the broadband signal elements inserted into the significantly expanded bandwidth region; and
  - an extension unit to a set-top box interfacing with a terminal or any other communication device including tuner components to control the additional channels combined within the expanded region of the frequency bandwidth, filtering  
25 components to separate the diverse frequency regions, modulators, and demodulators to decode the signal in order the enable the user to interact with the various elements of the signal and to encode the information resulted from the users request into the upstream region of the broadband signal; and
  - an enhanced cable connector assembly to provide for the downstream and upstream  
30 transmission of the signals having the proper spectral response characteristics.

47. The system of claim 47 further comprising a data communication unit including data routers, modulators, demodulators and a CPU to receive/transmit signals representing information units and insert the signals into the broadband signal for downstream or upstream transmission.
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48. The system of claim 47 further comprising a hub station unit including amplifiers to compensate for the losses of the broadband signals as a result of the transmission media characteristics, and multiplexer components to superimpose additional signals received from additional information sources into the broadband signal.
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49. The system of claim 47 wherein the size of the substantially expanded usable frequency range region is about 3000 Mhz.
50. The system of claim 47 wherein the range of the substantially expanded usable
- 15 bandwidth is about 5-3000 Mhz.
51. The system of claim 47 wherein the substantially expanded transmission bandwidth includes an about 5-35 Mhz region for the standard upstream transmission band.
- 20 52. The system of claim 47 wherein the substantially expanded usable bandwidth includes an about 50-750 Mhz region utilized as the standard downstream transmission band for the existing transmittable channels.
53. The system of claim 47 wherein the extended frequency band of about 1000-3000 Mhz
- 25 is allocated among a plurality of channels.
54. The system of claim 47 wherein the plurality of channels carry encoded signals superimposed on the broadband signal representing the entirety of the transmitted information.

55. The system of claim 47 wherein in symmetrical operation mode the extended frequency range of about 1000-3000 Mhz is divided into a downstream and upstream path each having a range of about 1000 Mhz.
- 5 56. The system of claim 47 wherein the additional external information source is a data communication network.
57. The system of claim 47 wherein the data communication network is the Internet.

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